

INTERNATIONAL STANDARD

IEC 61000-4-8

Edition 1.1
2001-03

Edition 1:1993 consolidated with amendment 1:2000

BASIC EMC PUBLICATION

Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMAGNETIC COMPATIBILITY (EMC) –**Part 4-8: Testing and measurement techniques –
Power frequency magnetic field immunity test**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61000-4-8 has been prepared by subcommittee 77B: High frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

It forms section 8 of part 4 of IEC 61000. It has the status of a basic EMC publication in accordance with IEC Guide 107.

This consolidated version of IEC 61000-4-8 consists of the first edition (1993) [documents 77B(CO)7 and 77B(CO)13] and its amendment 1 (2000) [documents 77B/291+293/FDIS and 77B/298+300/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 1.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

Annexes A and B form an integral part of this standard.

Annexes C and D are for information only.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until 2002. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

Withdrawn

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INTRODUCTION

This standard is part of the IEC 61000 series, according to the following structure:

Part 1: General

General considerations (introduction, fundamental principles)

Definitions, terminology

Part 2: Environment

Description of the environment

Classification of the environment

Compatibility levels

Part 3: Limits

Emission limits

Immunity limits (in so far as they do not fall under the responsibility of the product committees)

Part 4: Testing and measurement techniques

Measurement techniques

Testing techniques

Part 5: Installation and mitigation guidelines

Installation guidelines

Mitigation methods and devices

Part 9: Miscellaneous

Each part is further subdivided into sections which are to be published either as international standards or as technical reports.

These standards and reports will be published in chronological order and numbered accordingly.

This part is an international standard which gives immunity requirements and test procedures related to "power frequency magnetic field".

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Part 4-8: Testing and measurement techniques –

Power frequency magnetic field immunity test

1 Scope

This international standard relates to the immunity requirements of equipment, only under operational conditions, to magnetic disturbances at power frequency related to:

- residential and commercial locations;
- industrial installations and power plants;
- medium voltage and high voltage sub-stations.

The applicability of this standard to equipment installed in different locations is determined by the presence of the phenomenon, as specified in clause 3.

This standard does not consider disturbances due to capacitive or inductive coupling in cables or other parts of the field installation.

Other IEC standards dealing with conducted disturbances cover these aspects.

The object of this standard is to establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment for household, commercial and industrial applications when subjected to magnetic fields at power frequency (*continuous and short duration field*).

The standard defines:

- recommended test levels;
- test equipment;
- test set-up;
- test procedure.

Other kinds of magnetic fields would be object of standardization:

- fields at other power frequencies (16 2/3 – 20 or 30 – 400 Hz);
- fields of harmonic currents (100 Hz to 2 000 Hz);
- fields of higher frequencies (up to 150 kHz, e.g. for mains signalling systems);
- D.C. fields.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this section of IEC 61000-4. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this section of IEC 61000-4 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

3 General

The magnetic fields to which equipment is subjected may influence the reliable operation of equipment and systems.

The following tests are intended to demonstrate the immunity of equipment when subjected to power frequency magnetic fields related to the specific location and installation condition of the equipment (e.g. proximity of equipment to the disturbance source).

The power frequency magnetic field is generated by power frequency current in conductors or, more seldom, from other devices (e.g. leakage of transformers) in the proximity of equipment.

As for the influence of nearby conductors, one should differentiate between:

- the current under normal operating conditions, which produces a steady magnetic field, with a comparatively small magnitude;
- the current under fault conditions which can produce comparatively high magnetic fields but of short duration, until the protection devices operate (a few milliseconds with fuses, a few seconds for protection relays).

The test with a steady magnetic field may apply to all types of equipment intended for public or industrial low voltage distribution networks or for electrical plants.

The test with a short duration magnetic field related to fault conditions, requires test levels that differ from those for steady-state conditions; the highest values apply mainly to equipment to be installed in exposed places of electrical plants.

The test field waveform is that of power frequency.

In many cases (household areas, sub-stations and power plant under normal conditions), the magnetic field produced by harmonics is negligible. However, in very special cases like heavy industrial areas (large power convertors, etc.) they occur, and will be considered in a future revision of this standard.

4 Definitions

The following definitions and terms are used in this standard and apply to the restricted field of magnetic disturbances; not all of them are included in IEC 60050(161) [IEV].

4.1

EUT

equipment under test

4.2

induction coil

conductor loop of defined shape and dimensions, in which flows a current, generating a magnetic field of defined constancy in its plane and in the enclosed volume

4.3

induction coil factor

ratio between the magnetic field strength generated by an induction coil of given dimensions and the corresponding current value; the field is that measured at the centre of the coil plane, without the EUT

4.4

immersion method

method of application of the magnetic field to the EUT, which is placed in the centre of an induction coil (figure 1)

4.5

proximity method

method of application of the magnetic field to the EUT, where a small induction coil is moved along the side of the EUT in order to detect particularly sensitive areas

4.6

ground (reference) plane (GRP)

a flat conductive surface whose potential is used as a common reference for the magnetic field generator and the auxiliary equipment (the ground plane can be used to close the loop of the induction coil, as in figure 4)
[IEV 161-04-36, modified]

4.7

decoupling network, back filter

electrical circuit intended to avoid reciprocal influence with other equipment not submitted to the magnetic field test

5 Test levels

The preferential range of test levels, respectively for continuous and short duration application of the magnetic field, applicable to distribution networks at 50 Hz and 60 Hz, is given in table 1 and table 2.

The magnetic field strength is expressed in A/m; 1 A/m corresponds to a free space induction of 1,26 μ T.